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VOLUME AND PERFORMANCE TEST REPORT - PHASE 1

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Document Title:	VOLUME AND PERFORMANCE TEST REPORT - PHASE 1
Document Reference:	*TST/SOT/REP/0008*
Release:	INT14
Abstract:	This is the Volume and Performance Test Report for Phase 1 conducted on the V&I rig up to release 14.15.03
Document Status:	APPROVED
Author & Dept:	Michael Welch
External Distribution:	None
Security Risk Assessment Confirmed	YES – No Risk

Approval Authorities:

Name	Role	Signature	Date
Alan D'Alvarez	Programme Manager	See Dimensions for record	
Debbie Richardson	Test & Integration Manager	See Dimensions for record	
Lee Farman	Test Manager (POL JTT)	See Dimensions for record	

See HNG-X Reviewers/Approvers Matrix (PGM/DCM/ION/0001) for guidance on who should approve.

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0.2 Document History

Version No.	Date	Summary of Changes and Reason for Issue	Associated Change - CP/PEAK/PPRR Reference
0.1	29-Sep-2009	First draft for review by Joint Test Team	
1.0	16-Nov-2009	Final draft for Approval. Changes since last revision: 3.0 – Correction to table for Test Grp MCB 3.2 – Updated table of Open Defects following Peak re-tests since previous draft. 4.5 – Clarification of the number of active OSR services used for the tests.	

0.3 Review Details

*See HNG-X Reviewers/Approvers Matrix (PGM/DCM/ION/0001) for guidance on completing the lists below. You may include additional reviewers if necessary, but you should generally **not exclude** any of the mandatory reviewers shown in the matrix for the document type you are authoring.*

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Review Comments to :	
Mandatory Review	
Role	Name
Programme Manager	Alan D'Alvarez
Test & Integration Manager	Debbie Richardson
Test Manager (POL JTT)	Lee Farman
Solution Design/Development	Adam Cousins (Counter & BAL/OSR)
Solution Design/Development	David Harrison (Legacy Web Svcs, Agents & Audit, Crypto Host & Ref Data)
Optional Review	
Role	Name
Test Manager	Chris Young (POL JTT)
RV Manager	James Brett (POL JTT)
VI & TE Manager	Mark Ascott
Systems Qualities Architect	David Chapman
Lead Architect	David Johns
SV&I Manager	Sheila Bamber
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(*) = Reviewers that returned comments

0.4 Associated Documents (Internal & External)

Reference	Version	Date	Title	Source
[1] PGM/DCM/TEM/0001 *(DO NOT REMOVE)*	5.0	03 June 2009	RMGA HNG-X Generic Document Template	Dimensions
[2] TST/SOT/HTP/0003	1.0	12-September-2008	HNG-X Volume and Performance High Level Test Plan	Dimensions
[3] PA/PER/033			Horizon Capacity Management and Business Volumes	PVCS
[4] ARC/PER/ARC/0001			System Qualities Architecture	Dimensions

Unless a specific version is referred to above, reference should be made to the current approved versions of the documents.

0.5 Abbreviations and Terms

Abbreviation	Definition
BRDB	Branch Database
DAT	Main Host Database
DC	Data Centre
DCS	Debit Card Service
DRS	Data Reconciliation Service
DVLA	Driver Vehicle Licensing Authority
EOD BLOB	Attachment to End Of Day messages generated at a Horizon counter containing data pertaining to stock unit and product information
EPOSS	Electronic Point Of Sale Service
ETU	Electronic Top-Up
HLTP	High Level Test Plan
LREC	Link Reconciliation File
NTSS	Non Test Stream Specific
PAF	Postal Address File
PCI	The Payment Card Industry Data Security Standard
T&T	Track & Trace
TPS	Transaction Processing System

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Abbreviation	Definition
tps	transactions per second
V&I	Volume & Integrity

0.6 Glossary

Term	Definition
Performance Testing or Load Testing	A series of tests to measure the performance characteristics and behaviour of specific components of the solution under load to demonstrate their ability to achieve defined performance requirements. For example, to test that a particular web service is capable of supporting the relevant contractual peak rate of transactions per second (the defined load).
Volume Testing	A series of tests to demonstrate that the whole solution is able to support a typical daily workload. For example, to test that a peak weekday transaction profile can be successfully harvested and that all scheduled batch processing can be completed within expected timescales.

0.7 Changes Expected

Changes
Accepted comments following document review.

0.8 Accuracy

Fujitsu Services endeavours to ensure that the information contained in this document is correct but, whilst every effort is made to ensure the accuracy of such information, it accepts no liability for any loss (however caused) sustained as a result of any error or omission in the same.

0.9 Security Risk Assessment

Security risks have been assessed and it is considered that there are no security risks relating specifically to this document.

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1 Introduction

The Volume and Performance High Level Test Plan [2] outlined a 2-phase approach using different test environments:

> ➢ Phase 1 on the VI (Live rig) in IRE11 prior to pilot.

> ➢ Phase 2 on the Vol rig in IRE19 post pilot

The V&I rig used for Phase 1 was also used by other test streams; Integrity, Disaster Recovery and NTSS. This is the Test Report for Volume and Performance testing only, as executed during Phase 1.

Phase 1 Test Cycles were periods of testing activity (by all test streams) interspersed with rig build activity to introduce new Data Centre and Counter releases. There was no availability to repeat Test Cases within each cycle as originally intended and outlined in the HLTP.

This report provides a factual statement on the test status metrics at completion of Phase 1. The status of particular Test Cases and any associated defects can be ascertained from the Quality Centre system.

2 Scope

This report is solely concerned with the Phase 1 Volume and Performance test activities and is not reporting on the rig build activities that occurred before and during the period, or any other test stream activities conducted in the V&I test environment.

The main objectives of Phase 1 Volume and Performance testing focussed on those test areas that must be completed prior to live pilot. In essence, this concentrated on Horizon testing against a post-migration Data Centre, as there will be no opportunity to perform any Horizon testing on the Vol rig during Phase 2. In addition, some HNG-X 'calibration' testing was performed so as to provide benchmark performance characteristics to be used to validate the Phase 2 test environment on the Vol rig.

3 Management Summary

Use of the V&I test environment for other streams of testing (Integrity, Disaster Recovery, NTSS) severely restricted availability of the rig for volume and performance testing. Such testing could generally not be run in parallel with other test streams due to their intrusive nature. As a consequence of increasingly constrained rig availability, the list of tests identified in the HLTP were reviewed and re-prioritised. The following table shows a revised list of each test category identifying which Phase each would be tested in, or not tested at all. This differs from the table originally published in the HLTP. Those tests marked for Phase 2 will be further reviewed prior to commencement of Phase 2 to re-assess priorities in the light of any findings and considerations arising from Phase 1.

Green = tests conducted during Phase 1 and which are the focus of this report.

Yellow = tests earmarked for Phase 2 on the Vol rig

Pink = will not be tested. These are either subsumed in other tests or considered to be low risk.

Test Grp	Description	No. Tests	Phase 1 on V&I	Phase 2 on VOL	Not run
C01	Counter performance tests	40		Y	

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Test Grp	Description	No. Tests	Phase 1 on V&I	Phase 2 on VOL	Not run
H01	Horizon volume - Monday	2	Y		
H04	Horizon volume 2 day harvest	1			Y
H05	Horizon Debi Card to contractual limits - non-PCI	2			Y
H06	Horizon CAPO to contractual limits - non-PCI	2			Y
H07	Horizon Link to contractual limits - non-PCI	2			Y
H08	Horizon A&L to contractual limits - non-PCI	2			Y
H09	Horizon ETU to contractual limits	2			Y
H10	Horizon T&T to contractual limits	2	Y		
H11	APOP to contractual & design limits	2		Y	
H12	DVLA to contractual & design limits	4		Y	
H12b	DVLA stress test	1		Y	
H13	PAF to contractual & design limits	4	Y		
H13b	PAF stress test	1		Y	
HCB	Horizon combined banking to contractual limits - non-PCI	2	Y		
HPC	Horizon PCI combined banking & Debit Card to contractual limits	2	Y		
M01	Hydra mixed volume Monday	6			Y
M02	Hydra mixed volume Saturday	1			Y
M03	Hydra mixed volume Sunday	1			Y
M04	Hydra mixed volume 2 day harvest	1			Y
M05	Hydra mixed Debit Card to contractual and design limits	4			Y
M09	Hydra mixed ETU to contractual & design limits	4			Y
M10	Hydra mixed T&T to contractual & design limits	4			Y
MCB	Hydra mixed combined banking to contractual & design limits (PCI)	4			Y
R01	Branch router tests	4		Y	
X01	HNG-X volume Monday	6		Y	
X05	HNG-X Debit Card to contractual & design limits	4		Y	
X05b	HNG-X Debit Card stress test	1		Y	
X06	HNG-X CAPO to contractual & design limits	4		Y	
X06b	HNG-X CAPO stress test	1		Y	
X07	HNG-X Link to contractual & design limits	4			Y
X07b	HNG-X Link stress test	1		Y	
X08	HNG-X A&L to contractual & design limits	4			Y
X08b	HNG-X A&L stress test	1		Y	
X09	HNG-X ETU to contractual & design limits	4		Y	
X09b	HNG-X ETU stress test	1		Y	
X10	HNG-X T&T to contractual & design limits	4		Y	
X10b	HNG-X T&T stress test	1		Y	
X11	BAL and BRDB to contractual & design limits	2		Y	
X12	BAL and BRDB stress test	2		Y	
X13	Logon / logoff to contractual & design limits	2		Y	
X13b	Logon / logoff stress test	1		Y	
X13c	Maximum concurrent session	1		Y	
X15	HNG-X Reports to contractual & design limits	2		Y	
X15b	HNG-X Reports stress test	1		Y	

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Test Grp	Description	No. Tests	Phase 1 on V&I	Phase 2 on VOL	Not run
XCB	HNG-X combined banking to contractual & design limits	4		Y	
XCBb	HNG-X combined banking stress test	1		Y	
XCAL	HNG-X calibration test	1	Y	Y	

3.1 Test Case Coverage

The following table provides an overview of the final test status at the end of Phase 1 for each Test Case within those test groups highlighted in green above.

Test Group	Test Description	Status
H01	Horizon Volume Monday Schedule - State 1	✓ Passed
	Horizon Volume Monday Schedule - State 2	✖ Failed
H10	Horizon T&T Contracted Peak Hour	✓ Passed
	Horizon T&T Contracted Peak 5 minutes	✓ Passed
H13	PAF Contracted Peak Hour	✓ Passed
	PAF Contracted Peak 5 minutes	✓ Passed
	PAF Design Limit Peak Hour	✓ Passed
	PAF Design Limit Peak 5 minutes	✓ Passed
HCB	Horizon Combined Banking Contracted Peak Hour	✓ Passed
	Horizon Combined Banking Contracted Peak 5 minutes	✓ Passed
HPC	Horizon PCI Combined Banking and DCS Contracted Peak Hour	✓ Passed
	Horizon PCI Combined Banking and DCS Contracted Peak 5 minutes	✓ Passed
XCAL	HNG-X Calibration Test	✖ Failed

Full results for each test are detailed in Section 4 of this report.

3.2 Defects

3.2.1 Defects Raised

A total of 221 defects were raised by the Volume and Performance test team up to the conclusion of Phase 1 testing. A further 2 Peaks have been raised by the Performance Architect in relation to observations made during the HNG-X Calibration test (these are not associated with a defect reference in Quality Centre).

The following table shows the priority and status breakdown for these defects as at the date of this report.

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Current Priority PEAK (QC)	Open	Awaiting Test	Awaiting Closure	Closed	Totals
A (4 - Very High)	0	0	0	116	116
B (3 - High)	2	0	0	67	69
C (2 - Medium	0	0	0	38	38
D (1 - Low)	0	0	0	0	0
Totals	2	0	0	221	223

Open   Calls are with a development or support team
Awaiting Test   Calls have been returned to V&I awaiting retest or some other action
Awaiting Closure Calls are with V&I awaiting formal closure
Closed   Calls are closed, no further actions required

3.2.2 Open Defects

The following table shows the priority and call summary for all defects that currently remain Open.

QC Defect	Peak Ref	Pty	Summary	Assigned Team	Updated
9100	PC0180780	B	VI - Audit gatherer errors accessing platforms pcon001 - lprpcon001 & \\SWICON01\audit	tfs- Unix	20091105
11949	PC0188321	B	Volume Integrity - Final - EDS_BACKUP, ERP_BACKUP dependency issue.	HNG-back-dev	20091112

4 Test Case Details

This section provides a more detailed view of each Test Case executed for each of the Test Groups during Phase 1.

4.1 Test Group H01 – Horizon Volume

4.1.1 Horizon Volume (Monday) – State 1

The objective of this test was to exercise data centre processing for a peak day volume of representative Horizon transactions. State 1 represents all outlets in pure Horizon mode without the enabling of pre-migration reference data for generation of EOD BLOBs. As such, there was no workload for BRDB Hydra batch scheduling, but all batch scheduling was performed against a migrated Data Centre. Effectively, therefore, this test represents existing Horizon performed against new Data Centre.

Early iterations of this test identified a number of defects whereby critical schedules failed or took an inordinate amount of time to complete. The suite of batch schedules was unable to complete in the time available before next business day. However, subsequent fixes delivered enabled successful completion of the test. Whilst some issues remained with specific jobs, they were not of a nature that inhibited performance and the full suite of batch schedules was achieved within expected timescales to enable completion in time for rollover to the next business day at 8:00hrs

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Test Status: Passed

Date of Final Run: 19/08/09

Build Release: 14.14.01

4.1.2 Horizon Volume (Monday) – State 2

The objective of this test was to exercise data centre processing for a peak day volume of representative Horizon transactions. State 2 represents all outlets in Horizon mode but with pre-migration reference data enabled for generation of EOD BLOBs. This generates a workload for the BRDB Hydra batch processing.

The Volume State 2 test (which comprised 9597 outlets and represents circa 75% of live) failed to complete running of the overnight schedule within the allotted timeframe. Three main issues were observed during the run, all of which occur during the Hydra operation:

1. The transfer of the files from TPS to the BRDB caused the DAT to run at maximum utilisation for periods. This operation is scheduled pre midnight and despite the high utilisation the schedules completed in time. Notwithstanding this, the condition is being investigated to satisfy ourselves that there are no underlying issues that may cause problems in live operation.
2. BRDB Hydra Proc took 4hrs 1min to complete. This process kicks off at around 2am and currently does not complete in sufficient time to allow following process to complete prior to branch trading.
3. BRDB Statistics Process takes longer the first time this is run. Subsequent running of this process is complete in a much reduced timeline.

Issue [2] above is considered a 'stopper' and is required to be addressed prior to Weekend B/C. A number of options for addressing this have been considered. The general consensus was that a technical solution could be found to decreasing the time taken for the schedule to run. However, this will require thorough analyses and the development of a fix which is likely to be a combination of tuning, configuration and code changes. This will likely take a number of weeks to deliver and would require validation in an environment able to test under representative volumes. To follow this course of action alone would have resulted in a delay to handing over the V&I rig to DC Prep and slip the Weekend B/C Migration weekend.

A procedural solution was also considered and this was accepted to have less technical risk but would create significant additional work for Fujitsu, Post Office Operations and the post masters during branch migration. The procedural solution requires us to demonstrate that BRDB Hydra Proc would complete before 4am with 20% of branches set within the database at 'HydraT', thus reducing the processing load for this part of the schedule. To follow this course of action alone would require the additional processes required to support the implementation of the pilot sites to continue through the full roll out (for example, to create the Post Masters Remuneration Report the post master will need to produce both a pre migration and post migration report and manually reconcile the two). This would significantly increase the risk to completing the Branch Migration within the current scheduled timeframe.

The focus was on maintaining the current date for starting the Weekend B/C Migration, (30/10) whilst minimising the risk to the Branch Migration. To achieve this, a hybrid way forward was agreed:

1. To validate that the BRDB Hydra Proc will complete before 4am with 20% of branches set within database to HydraT. If successful;
2. Hand over the V&I rig to DC Prep. In parallel;
3. Development work on a technical solution
4. B/C Weekend will complete with 10% - 20% of branches set within the BRDB to HydraT (the 10% - 20% will need to contain the candidate Pilot sites and preferable those branches likely to be at the beginning of the roll out schedule)

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5. Technical fixes to be validated in the first instance on SV&I to validate correct operation of the BRDB and schedules
6. Once validated on SV&I and LST, the fixes to be delivered to Live and performance monitored with the '20% processing load'.
7. Once satisfied that the fixes improve the performance of the Schedule the number of the branches set within the BRDB to HydraT will be increased in increments (e.g. 30%, 40%, 50%). At each increment the performance of the Schedule will be monitored for a period of time requiring achieving set criteria prior to moving to the next increment.
[Note: Once the numbers of branches set to HydraT in the BRDB is incremented this action cannot be reversed. Therefore it is important to increment the numbers in a controlled way to ensure that the overnight schedule completes within the allocated time]
8. Should the fixes prove successful, and the branches set within the BRDB reach 100% prior to 84 days before end of Pilot, the system will be able to support branch roll out without the need to continue with the additional Pilot processes.
9. Should the fixes not prove successful the Programme could choose to:
   a. Not exit Pilot until a technical solution has been implemented [Note: in this scenario the Pilot could be extended to the 1250 - 2500 branches set within the BRDB to HydraT], or
   b. Exit pilot and proceed with the roll out continuing to use the additional Pilot processes

A retest of Horizon Volume State 2 with only 2500 outlets (circa 20% of live) as per [1] above was therefore executed. Whilst BRDB Hydra Proc still did not complete before 4am as performance improvement was not linear (2 hours 26 minutes for 2500 outlets versus 4 hours 1 minute for 9597 outlets), the full suite of BRDB schedules did complete before next busing day and start of branch trading.

Further changes to BRDB Hydra Proc are now also being developed so as to split the workload into pre-processor tasks that can be run before midnight (and make use of a current 'quiet' period in BRDB scheduling), and compare modules that will continue to run at around 2am. This will enable the entire process to complete much earlier. This change (which also requires amendment to the batch scheduling) is to be delivered prior to Weekend B/C Migration

Investigation into the DAT utilisation will continue and any tuning/fixes will be introduced as part of the actions described in [5] and [6] above. Meanwhile, a DRS Schedule amendment will be made to add dependency on BRDB_XFR_COMPL for night running of DRSC310 in schedules DRS_NWB_MS_NIGHT and DRS_EFT_MS_NIGHT in order to reduce load on the DAT server and to even out the load. This is possible as the DRS LREC file doesn't need to be processed before 02:00am

Test Status: Failed – further fixes to be delivered in accordance with the way forward outlined above.

Date of Final Run: 21/09/09

Build Release: 14.15.00

4.2 Test Group H10 – Horizon T&T

4.2.1 Horizon T&T Contracted Peak Hour / Peak 5 Minutes

The contracted peak hourly and peak 5 minute transaction rates for Horizon T&T equate to the same rate of tps. Effectively, therefore, they comprise a single test. The transaction rates initially run for this test were in accordance with those defined in the Horizon Capacity Management and Business Volumes [3]. Namely;

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Peak Hour Contracted Volume = 42,500 = 11.81 tps

Peak 5 Minutes Contracted Volume = 11.66 tps

The test was therefore run at a rate of 12 tps for a period exceeding 1 hour, with the load balanced evenly across all 4 clusters. This rate was successfully maintained with no transaction failures. Performance monitoring (from analysis of Windows Perfmon logs and Metron Athene data) indicated no performance issues on any of the key platforms involved in processing T&T transactions (NRA, FLG and NPS platforms).

Subsequent to the above test, at the request of the Performance Architect in consideration of increasing live volumes, the test was re-run with a significantly increased rate of 52 tps. Again, this rate was successfully sustained for a period exceeding 1 hour with no indication of any performance concerns on any of the key platforms involved.

Test Status: Passed

Date of Final Run: 15/06/09

Build Release: 14.10.00

4.3   Test Group H13 – PAF

4.3.1   PAF Contracted / Design Peak Hour / Peak 5 Minutes

The Peak Hour and Peak 5 Minute ratess for PAF are similar and targets are as follows:

Peak Hour Contracted Volume = 162,246 = 45 tps

Peak 5 Minutes Contracted Volume = 46 tps

Peak Hour Design Limit volume = 194,695 = 54 tps

Peak 5 Minutes Design Limit Volume = 56 tps

A single test was run to demonstrate the maximum sustainable rate for a period exceeding 1 hour against a single PWS server (i.e. the maximum load supported by a single server).

First iteration of the test failed to achieve contracted volumes and only sustained 33 tps. Investigations identified incorrect configuration of the PWS server. Specifically, the expected configuration is:

a) 4 EJBs for the PAFEnglishSession

b) English.ini should contain Total_Result_Limit = 600

The actual configuration only had 3 EJB's and the English.ini did not contain the Total_Result_Limit = 600 (JVM was correct at 256MB and thread concurrency of 1 was also correct).

Second iteration of the test with correct configuration of the PWS server again failed to achieve contracted volumes and was only able to support 37 tps. This was with the PWS server located in an area with 2x vCPU vBLADES as per the original server layout plan.

The PWS server was relocated to 4 x vCPU vBLADES (it was swapped with a BWS server which has much lower throughput and for which 2 x vCPU would suffice).

Third iteration of the test demonstrate that the achievable successful rate of transactions per second peaked at 54tps. This rate was sustainable for a period well in excess of 1 hour and therefore achieves the Design Limit Peak Hourly rate of 54 tps. A Change Proposal was raised to formalise relocation of the servers.

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Test Status: Passed

Date of Final Run: 07/05/09

Build Release: 14.07.03

4.4 Test Group HCB – Horizon Combined Banking

4.4.1 Horizon Combined Banking Contracted Peak Hour

The target contracted peak hour rate for Horizon combined banking is as follows:

Contracted: Peak Hour Volume:

CAPO = 484,174 = 134 tps

Link = 97,750 = 27 tps

A&L = 36,316 = 10 tps

TOTAL = 171 tps

First iteration of the test was only able to support a combined total of 171 tps for a few minutes before a significant number of transaction timeouts began to occur. Subsequent investigations identified the cause to be a time synchronisation issue between the Routing Agent and Authorisation Agents, which resulted in the Authorisation Agent regarding transaction requests as 'stale'.

Having resolved the time synchronisation issue, the second iteration of the test successfully demonstrated that the contracted peak hourly rate of 171 tps was sustainable for a period exceeding 1 hour.with no transaction failures. Performance monitoring (from analysis of Metron Athene data) indicated no performance issues on any of the key platforms involved in processing Horizon Banking transactions (NRA, NAC, NAL, NAA and NPS platforms).

Test Status: Passed

Date of Final Run: 15/06/09

Build Release: 14.10.00

4.4.2 Horizon Combined Banking Contracted Peak 5 Minutes

The target contracted peak 5 minute rate for Horizon combined banking is as follows:

Contracted: Peak Hour Volume:

CAPO = 160 tps

Link = 32 tps

A&L = 12 tps

TOTAL = 204 tps

The test began at a rate of 120 total tps increasing by 50 tps every 5 minutes up to a maximum total of 320 tps. The maximum rate of 320 tps was successfully sustained without any transaction failures for a period exceeding 20 minutes. This therefore demonstrates that a rate well in excess of contracted peak 5 minute volumes can be sustained.

Test Status: Passed

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Build Release: 14.10.00

4.5 Test Group HPC – Horizon PCI Combined Banking & Debit Card

The following tests were conducted with 8 active Horizon OSR services, 1 on each of servers BAL001 to BAL008.

4.5.1 Horizon PCI Combined Banking & Debit Card Design Peak Hour

Current contracted and design limit peak hour tps rates for Horizon PCI are as follows:

	CAPO	Link	A&L	DCS	TOTAL
Contracted Peak Hour	134	27	10	22	193
Design Limit Peak Hour	161	33	12	26	232

The actual test run was at / above the design limit rates (thus effectively proving the contracted rates anyway), and successfully sustained the following rates for more than an hour with no transaction failures.

	CAPO	Link	A&L	DCS	TOTAL
Average tps sustained	177	33	13	29	252

Test Status: Passed

Date of Final Run: 12/07/09

Build Release: 14.11.04

4.5.2 Horizon PCI Combined Banking & Debit Card Design Peak 5 Minutes

Current contracted and design limit peak 5 minute tps rates for Horizon PCI are as follows

	CAPO	Link	A&L	DCS	TOTAL
Contracted Peak 5 Minutes	160	32	12	22	226
Design Limit Peak 5 Minutes	250	51	19	34	354

However, with Debit Card transaction rates being subject to renegotiation, the target rate for DCS was set at 57 tps in line with future expectations.

The actual test run was at / above the design limit rates (thus effectively proving the contracted rates anyway), and successfully sustained the following rates for more than 5 minutes with no transaction failures.

	CAPO	Link	A&L	DCS	TOTAL
Average tps sustained	256	50	19	57	382

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Test Status: Passed

Date of Final Run: 12/07/09

Build Release: 14.11.04

4.6 Test Group XCAL – HNG-X Calibration Test

The objective of the 'calibration' test was to run a reduced basket mix of HNG-X transactions, but at reasonable volumes, in order to capture performance metrics of the V&I rig using Metron Athene Data gathered for the period of the test run. The same test would then be performed on the Vol rig to help understand any environment differences and how this could affect interpretation of performance results

An initial test was performed for EPOSS transactions only, before later attempting a more representative basket mix.

4.6.1 HNG-X Calibration – Simple EPOSS

This test comprised of simple EPOSS transactions (selling a stamp) only and the conditions under which the test was run are as follows:

> There were 16 OSR instances in total, with 2 OSRs running on each of servers BAL001 – BAL008.

> There were 4 BRDB nodes available.

> The bandwidth was throttled to 256Kbps from the load generator to the ACE Blade.

> All messages were compressed.

> The 400 branches used in the test were spread across the fad hashes to generate an even load across the 4 BRDB Nodes.

The incremental rate of transaction volumes during the run was as follows:

> 150 tps (across 150 branches) for 15 minutes, then increased to

> 200 tps (across 200 branches) for further 15 minutes, then increased to
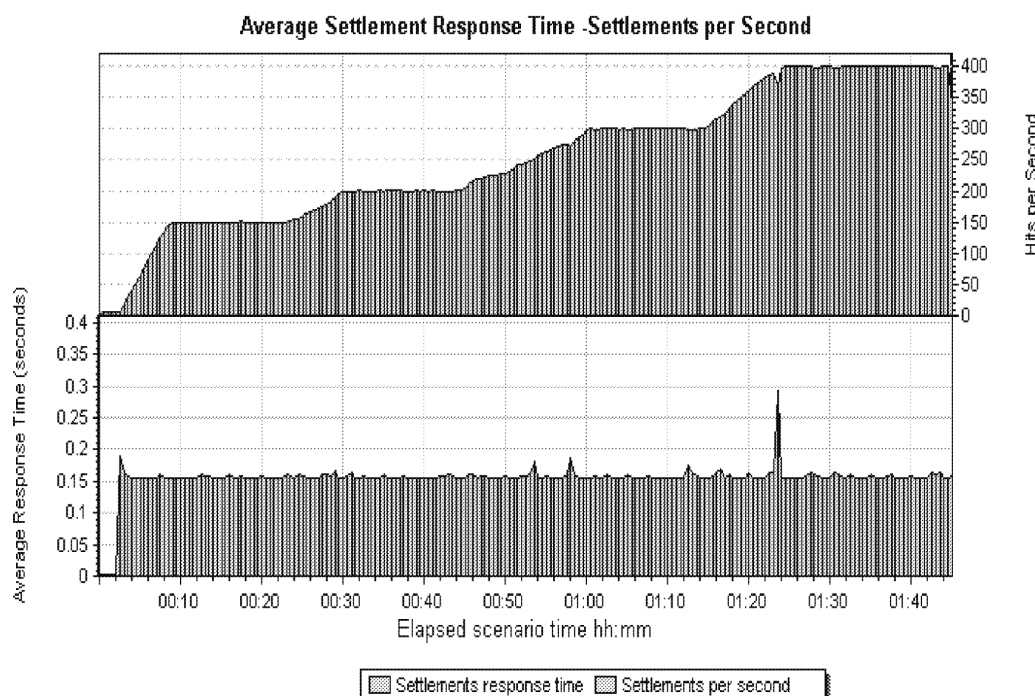
> 300 tps (across 300 branches) for further 15 minutes, then increased to

> 400 tps (across 400 branches) until the end of the test.

Throughout this test run, transaction response times were good

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Average Settlement Response Time -Settlements per Second

Test Status: Passed

Date of Final Run: 6th August 2009

Build Release: 14.12.01

4.6.2 HNG-X Calibration – Basket Mix

Several attempts at running a calibration test for a mixed basket containing EPOSS, Banking, Debit Card, ETU, DVLA, Logon and Logoff transactions were run on the 18th and 19th September. All iterations were run under the following conditions:

There were 16 OSR instances in total, with 2 OSRs running on each of servers BAL001 – BAL007 and BAL009.

There were 4 BRDB nodes available.

The bandwidth was set to maximum between the load generator and the ACE Blade.

All messages were compressed.

All branches used in the test were spread across the fad hashes to generate an even load across the 4 BRDB Nodes.

All banking transactions were submitted for agent hash value 1, meaning that only the capo_b, al_b and link_b services were handling transaction load.

Whilst this has generated some data that can be used for comparison purposes when run under similar conditions on the Vol rig, issues were encountered during each run and not all transaction requests were

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successfully authorised. As at the date of this report, the reason for transaction failures is not yet known and investigations are continuing.

Test Status: Failed

Date of Final Run: 19/09/09

Build Release: 14.15.00

An outline of each iteration is shown in the following sections. In each table, the value shown for Txn/sec is the total number of transaction records per second for each service type, including settlement transaction (i.e. the number of transactions addressed to the BAL layer). The values shown for Auth/sec is the number of actual requests that would be forwarded to each relevant Authorisation service. The end column shows the median number of transactions per second successfully authororised for banking, debit card and ETU services.

4.6.2.1 Mix of EPOSS/Banking/Debit/E-TopUps/DVLA/Login/Logoffs @ 100tps

Function	Users	Txn/sec	Auth/sec	Pass/sec
0700_CAPO_CAL	37	37	13	11.047
0800_AL_CAL	3	3	1	0.766
0900_LINK_CAL	7	8	3	2.5
1000_EPOSS_CAL	23	24	24	
1100_DEBIT_CAL	7	6	3	2.047
1200_LoginLogoff_CAL	8	4	1	
1300_DVLA_CAL	7	11	6	
1400_ETU_CAL	8	8	3	2.641
	100	101	54	

After a 5 minute ramp up 103 tps was reached. After 25 minutes there was a sudden drop in successful authorisation rate. After 40 minutes the rate of successful transactions deteriorated further.

4.6.2.2 Mix of EPOSS/Banking/Debit/E-TopUps/DVLA/Login/Logoffs @ 200tps

Function	Users	Txn/sec	Auth/sec	Pass/sec
0700_CAPO_CAL	75	75	25	16.078
0800_AL_CAL	7	7	2.33	1.547
0900_LINK_CAL	13	14	4.68	4.609
1000_EPOSS_CAL	47	49	49	
1100_DEBIT_CAL	13	13	4.17	3.531
1200_LoginLogoff_CAL	17	9	2.91	
1300_DVLA_CAL	13	20	6.76	
1400_ETU_CAL	15	15	5	3.906
	200	202	100	

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4.6.2.3   Mix of EPOSS/Banking/Debit/E-TopUps/DVLA/Login/Logoffs @ 300tps

Function	Users	Txn/sec	Auth/sec	Pass/sec
0700_CAPO_CAL	112	112	37.33	22.297
0800_AL_CAL	11	11	3.66	2.594
0900_LINK_CAL	19	21	6.84	6.656
1000_EPOSS_CAL	71	75	75	
1100_DEBIT_CAL	19	19	6.16	5.063
1200_LoginLogoff_CAL	26	13	4.45	
1300_DVLA_CAL	19	30	9.88	
1400_ETU_CAL	23	23	7.66	5.984
	300	303	151	

4.6.2.4   Mix of EPOSS/Banking/Debit/E-TopUps/DVLA/Login/Logoffs @ 400tps

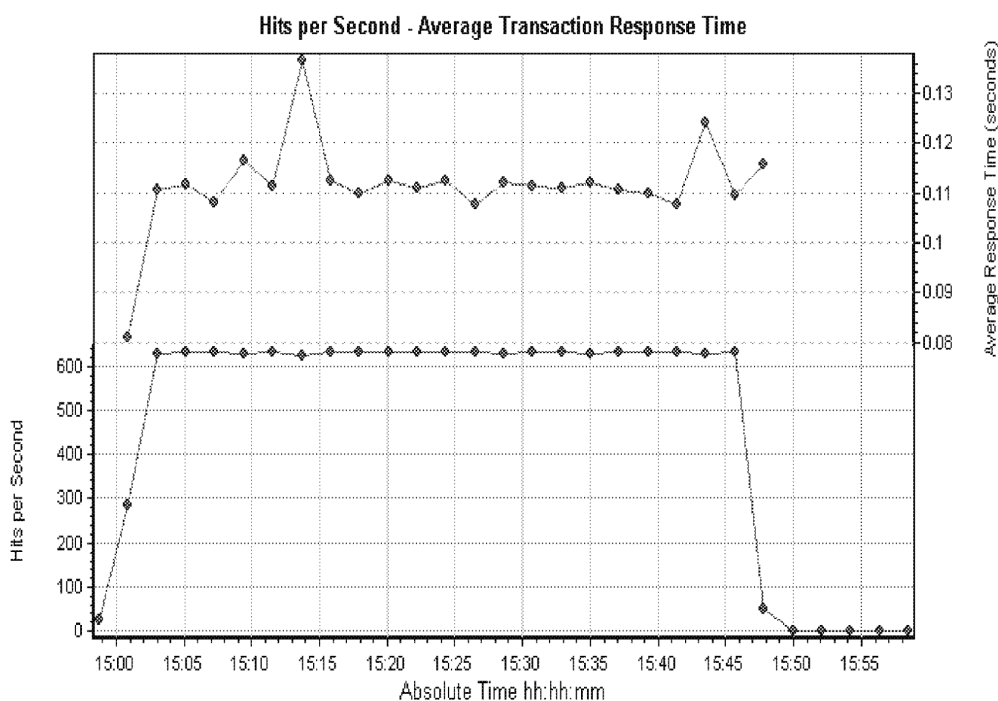| Function	Users	Txn/sec	Auth/sec	Pass/sec
0700_CAPO_CAL	150	150	50	10.576
0800_AL_CAL	15	15	5	3.984
0900_LINK_CAL	25	27	9	5.719
1000_EPOSS_CAL	95	100	100	
1100_DEBIT_CAL	25	22	8	0
1200_LoginLogoff_CAL	35	30	6	
1300_DVLA_CAL	25	26	13	
1400_ETU_CAL	30	30	10	7
	400	400	201	

The CAPO service was initially authorising at a rate of approximately 26 tps, but saw a significant reduction to approximately 10 tps for a period of 20 minutes before the NAC004 service then failed over to NAC003 and the authorisation rate recovered to around 36 tps. The average Pass rate was 17tps but the median value above is somewhat 'skewed' by the 20 minute period of low authorisation rates prior to the agent failover.

The LINK service was initially authorising at a rate of approximately 9 tps before a sudden reduction to 5.7 tps t 10 minutes into the run.

The Debit Card service failed after only a few minutes into the run.

4.6.2.5   Simple EPOSS transaction (selling a stamp) @ 646tps

Function	Users	Txn/sec
1000_EPOSS_CAL	646	646

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Hits per Second - Average Transaction Response Time

EPOSS only transactions produced similar successful results as previously demonstrated.

4.6.2.6   Mix of EPOSS/Banking/Debit @ 888tps

Function	Users	Txn/sec	Auth/sec	Pass/sec
0700_CAPO_CAL	600	525	175	0
0800_AL_CAL	50	36	12	5.531
0900_LINK_CAL	100	99	33	2.78
1000_EPOSS_CAL	150	150	150	
1100_DEBIT_CAL	100	78	26	6.703
	1000	888	396	

The CAPO service failed after only a few minutes into the run.

The LINK service failed approximately 25 minutes into the run.

The Debit Card service failed for a period of 15 minutes mid-way through the run.

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5 Recommendations

- o Continue with development fixes for BRDB processing improvements in accordance with the way forward outlined in section 4.1.2
- o Continue investigations as to the cause of issues encountered during HNG-X Calibraton test runs.
- o Review planned activities for Phase 2 testing on Vol rig in light of any considerations arising from Phase 1 testing.

6 Conclusions

Whilst the originally intending level of testing for Phase 1 as outlined in the HLTP was significantly reduced, the revised objectives pertaining to Horizon testing have been achieved subject to the introduction of further performance improvement fixes for BRDB Hydra batch schedule processing.

As regards HNG-X Calibration testing, whilst this has enabled Metron Athene data to be captured for comparison with results to be achieved on the Vol rig, concerns remain as to the transaction failures encuntered during these tests. It is not currently understood whether such failures were due to issues with the test data itself, environment issues caused by other activities on the rig, or regression in behaviour of the Authorisation Agents.

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